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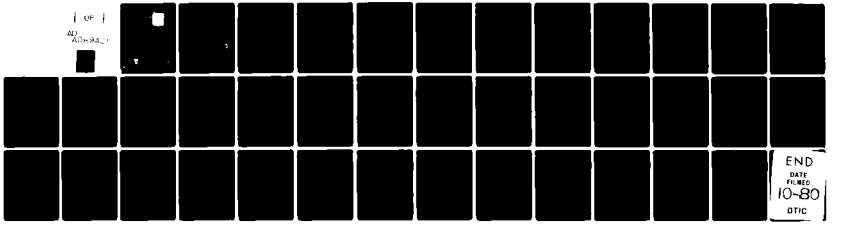

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HYPERMODERNIZATION FOR THE TWENTY-FIRST CENTURY: THE VITAL STEP BEYOND MODERNIZATION FOR THE 1980'S

by

Lieutenant Colonel David S. Jackson, FA

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The methodology was a simple synthesis of ideas gleaned from three sources: (1) personal research; (2) lectures and classes at the US Army War College; (3) interviews conducted at several research institutions.

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USAWC MILITARY STUDIES PROGRAM PAPER

HYPERMODERNIZATION FOR THE TWENTY-FIRST CENTURY: THE VITAL STEP BEYOND MODERNIZATION FOR THE 1980'S

This report provides a framework for the Army to go beyond mere modernization: how to hypermodernize in order to offset the current force imbalance which has developed relative to the Soviet Union

AN INDIVIDUAL RESEARCH PROJECT

by

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15 May 1980

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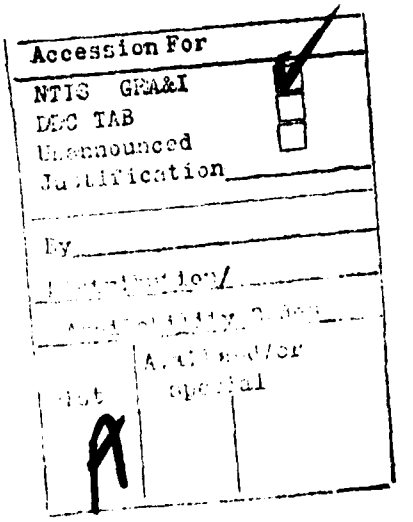

PREFACE

The genesis of this work was the conspicuous absence of any semblance of a unified long range plan which bound together the presentations of the key military and civilian leaders of the Army as they spoke to the Class of 1980 during the past academic year.

The author had as a guiding premise that the ongoing Army modernization effort was only a first step to achieving the kind of force posture which is not dwarfed by the Soviet Union's numbers and made obsolete by Soviet technology. Thus, the paper seeks to rethink our existing research, development, and acquisition process with a view to the long range. To the extent the paper provides a departure platform for the prodigious thought necessary to get on in the tough business of planning and organizing for the long range posture of the Army, the paper fulfills its purpose.

The author is deeply indebted to Dr. Roy Amara, Institute of the Future, for sharing his deep insights concerning long range planning and the practical limitations of overly centralized planning in a democratic and innovative society. Mr. Gerald Sears of Rand provided the perspective of a seasoned veteran in the arena of research institution support for military weapons systems. Finally, Mr. Larry Low of SRI hosted for the author a seminar of research experts in military planning. Lloyd Peters, Philip Whalen, and John Emanski, who attended the seminar, with Larry provided insights and challenges to the author which were key to the author's motivation and the completion of the study effort.

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CHAPTER I

BACKGROUND

The United States Army is in the process of the most comprehensive and costly modernization effort in its history. The modernization provides the systems to redress the imbalance of conventional forces which has evolved between the United States and the Soviet Union during the last two decades. While the modernization must proceed, it is equally important for the Army to look beyond its current efforts to provide the forces and systems which will win on the battlefield of the twenty-first century. The Army must not only modernize but it must seek to hypermodernize to avoid another round of "catch up football."

Since Alvin Toffler wrote Future Shock, the industrialized nations have become increasingly caught up in the whirlwind of change. Particularly important has been the rapid pace of technological change. Toffler attributes the rapid pace to a production system which exists to speed the innovation process. There are more "think tanks," engineering consultants, and diversified industrial complexes. Toffler further cites the results of a study by Robert B. Young of Stanford Research Institute (SRI) in which Young showed the compression of time required to reach peak production once a home appliance had been developed and marketed. The comparison between the period prior to 1920 and the period from 1939 to 1959 showed the time from marketable prototype to peak production had been reduced 76 percent.

There are significant military consequences of such change. Two perspectives which differ only slightly in order of magnitude make the point. Herman Kahn has catalogued major weapons systems changes starting in 1951 and

thereby generated, somewhat imperically, a theoretical basis to argue that every five years weapons systems prompt a major change in strategic doctrine.[1]

Lloyd Peters of SRI has been a bit more conservative, but having done a similar kind of analysis he points to a ten-year cycle of doctrinal change caused by the push of technological advances in weapons systems.[2] There is in this dynamic of technological change the promise of both benefit and liability as we face the future. On the one hand, we may realize some opportunity to produce the new weapons systems which should free the United States from the extortion which attends the grand scale of the Soviet military improvements over the past two decades. Yet we must be careful to select from among the veritable tidal wave of technological opportunities, those technologies which promise the greatest payoff.

The selection process and the system to take advantage of the technology explosion is not currently geared to function in the face of such rapid change and vast amount of input. The major weakness is the growing gap between planning and execution. The problem is best posed by example. The Patriot System, the Army's most advanced air defense system ever, is twenty years in the making. Still, most any senior planner inside or out of the Army will limit our ability to look ahead to five years. There are some analysts, such as Philip Whalen, SRI, who see a constitutional limitation upon our being able to plan effectively more than two years in advance.[3] On balance, Whalen's concerns, though justified, impact more directly upon execution of systems development because of the change of actors at all levels to include congressional. So the problem still remains. How can we rationalize the current research, development, and acquisition process? Are there effective methods for looking well into the future to determine requirements so as to make better decisions today on selection of technologies and systems consistent with future requirements?

Should we alter our existing research, development, and acquisition structure to accommodate a more rational approach to bringing on new systems?

CHAPTER II

TECHNOLOGY EXPLOSION AND TECHNOLOGY FORECASTING

The three questions posed are central to being able to provide a framework for the hypermodernization of the Army--to go beyond merely matching the capabilities of the Soviets or any other adversary for that matter. The question of rationalization is first. In the sense used here, rationalization means bringing more structure and order to the process of bringing new systems into the Army structure. Is this necessary? The Patriot system example only partly suggests the answer. One may consider the apparent inconsistency in the increases in time to field new systems in light of apparent decreases in time to realize new technological opportunities. In general, complexity has increased for our newest systems. But very important is the fact that complexity aside, the full process for development of technology is taking longer in spite of the rapid pace of generating new ideas. Technological innovation may be viewed as an eight-step process:[4]

(1) idea

(2) proposal or design concept

(3) verification

(4) lab demonstration

(5) prototype

(6) introduction as working military or commercial systems

(7) widespread adoption

(8) proliferation

For most military purposes the time clock for bringing on a new system may stop at step six. However, the cross-over of a technology for application in new unrelated areas may have military significance and may not happen until

step eight. Of immediate concern for the purposes of this discussion is the observation that only the first three steps seem to be decreasing in time while the other steps are generally increasing. The net result is a real time increase to get a new technology in a usable form. There is also a "population explosion" of scientifically verified ideas which though promising may take years to get to a fruitful application. It would be a tragic mistake to misread the result here. The prudent individual must interpret the analysis as providing many new opportunities well beyond our current planning horizon. There is then an increasing burden upon the Army to push its lock farther into the future. Also, the Army must overcome the increasing complexity of systems development to design its approach to developing new systems in a manner which considers where we want to go and where our principal adversary is going. What is emerging is an approach which must blend intelligence and forecasting of the threat, our evaluation of promising technologies to transcend the capabilities of major threat investments in weapons systems, and the structure and doctrine to bind together our new systems. Together these form the basis for a more rational research, development, and acquisition system.

The question of methods of forecasting requires detailed discussion. Traditionally looks into the future were considered the purview of clairvoyants and mystics. Today the attitudes concerning long range predictions have changed. There is greater acceptance of forecasting as a useful planning tool. The pace of change requires government and industry to seek ways to cope with change and to reduce the impact of uncertainty.[5] There has been a progressive increase in the ability to select future trends and to influence the probable future outcomes based upon actions taken today. We are now much less fatalistic in our planning.[6] Moreover, the continued development of techniques in the soft

sciences promises to provide a strong basis for forecasting and for solutions to problems which may face men in the future.[7]

The techniques for forecasting fall into two major categories: normative and exploratory.[8] The exploratory forecast uses current data to provide insight into the future. The normative forecast starts with a desired future outcome and works out the steps to achieve the future result. Much of the basic research into forecasting methodology has been done by researchers at RAND Corporation and the Institute for the Future. Discussions with Dr. Roy Amara of the Institute have provided the author with some important insights into the methods of forecasting.

Dr. Amara acknowledges the general exploratory and normative forecasting definitions but prefers three working definitions for adapted categories which he evaluates to be most useful in providing information to decisionmakers. Dr. Amara is firmly committed to the proposition that the "true test of long range planning efforts and methods are the direct impacts that such planning has on today's decisions." Thus, Dr. Amara rank orders based upon frequency of use the following: (1) judgment based forecasting; (2) precausal modeling; (3) causal modeling. One caveat is necessary at this point. The ranking is perhaps in inverse order of what Dr. Amara would judge to be of greatest use to the decisionmaker. This is mainly because the judgment method--albeit highly trained judgment--calls for rather subjective conclusions by the group of experts used in the judgmental forecasting. Precausal and causal modeling seek to determine relationships with the latter method seeking such strong cause and effect relationships as to allow predictive conclusions with a well defined statistical base. The studies commonly given the generic name "DELPHI" are examples of the group judgment approach. The key to the group judgment approach is selecting individuals who are highly credible as experts in the field but

who can demonstrate a good "batting average" in predicting trends and outcomes. Various types of trees and matrices are examples of the precausal approach, with games being examples of the highly developed causal models.

Methods such as those described tie together with the changing attitudes concerning future forecasting to foster new opportunities for decisionmakers. A major benefit of the long range planning will be realized through a gain in potential to avoid false starts and erroneous direction of resources for bringing on new systems.[9] Forecasting will also provide means to uncover unexpected or unforeseen problems but more importantly open up avenues for unexpected options or alternatives.[10] Central to the Army would be the opportunity to develop a total rationale for an investment strategy capable of integrating the technical and tactical communities. The result would be to clarify the relationships among technology; research and development; and doctrine or organizational changes.[11] Achieving such a result is essential to the future national security. We cannot afford a fanciful approach to the design and building of our Army. Unfortunately, much of what we have brought to operational capability is constrained by materiel fashion trends. Such trends are derived from strategic concepts which offer narrowly defined weapons options. As early as 1968 analysis of the fashions in weapons systems was completed by Dr. D. G. Brennan of the Hudson Institute.[12] He pointed to the historical gentleman's agreement which proscribed certain weapons or methods in combat. Biological warfare is not acceptable today but even more subtle limits apply when a strategy such as massive retaliation places priority on one system--such as nuclear weapons, while devaluating the importance of other systems--in this instance more conventional systems. A close parallel is found in the current strategy which incorporates Mutual Assured Destruction (MAD) and relies on the deterrent capability of a destructive second strike. Thus, while experts

attribute the degradation in US conventional force posture to Vietnam expenditures, and post-Vietnam defense cuts, some of the reduced conventional force capability can be traced directly to the continued reliance on strategic deterrence. Such a strategy diminished the role for conventional forces to deter aggression.

The fashion trending interacts with another dynamic--military conservatism--to moderate further the long range planning. Consequently, opportunities are lost to incorporate new technology and to improve the capabilities of the Army. History reflects the conservative nature of military planners. Change is slow. Evolution of doctrine and systems is the norm. This mode persists often in the face of overwhelming evidence to make major changes in thought and structure. Wilbur B. Payne, at the time Deputy Under Secretary of the Army (Operations Research), spoke in 1977 to the NATO Special Program Panel on Systems Science which was held at Ottobrunn, West Germany. He highlighted the penchant for conservatism which has too often frustrated any possibility for major revisions of military capabilities even when such revisions were suggested by quantum increases in effectiveness of battlefield systems. The 100 years of the battles of Crecy, Poitier, and Agincourt illustrate the point. In all three battles the adversaries were the same. The same side mounted a cavalry charge into the massed firepower of long bows with no thought to the changes in battle which were produced by the long bow.[13] The interim period of the world wars serves also to highlight the conservatism that marked the military community particularly the planners in the United States Army. Only the German war planners grasped the significance of the airplane and tank with sufficient foresight as to revolutionize the approach to land combat. The United States Army was victimized by the proponents of horse cavalry. Giving full weight to the impact of "The Great Depression" only paltry sums were spent to build and

exploit the mobility and fighting capability of the tank. Even when we did get on with the task of mechanizing our forces in WW II, the Sherman Tank proved far short of being the technologically superior system on the battlefield.[14]

The examples cited only begin to point out the problem of the pitfalls of military conservatism and the related evolutionary approach to new systems and doctrine. For the Army today the risk could be the loss of major initiatives. While we continue the process of evolutionary modernization there is virtually no discussion of those revolutionary systems and doctrine which are necessary to bankrupt the Soviet investments in air defense and armor. Soviet advances in both areas has resulted in a conventional force structure which is not balanced by the United States and only marginally balanced by the whole of the NATO ground conventional force structure.

Thus, the efforts toward effective planning and long range forecasting offer the opportunity to open vast new vistas for finding new technologies from which will come the systems and doctrine of the decades of the near twenty-first century. Some opportunities are already being realized from use of forecasting methods. The Navy has had some rudimentary success at predicting total force personnel requirements related to changes in major systems. Work by Pamela Cook recorded in a 1977 Office of Naval Research document provides insight into a method to model the force for a number of key systems. Cook first discussed techniques to determine the technological components of new systems and methods to determine the numbers of people associated with each component. A data bank stores the number of people for each component, for selected key systems, over a history of several years. From the data bank inferences can be made concerning the personnel requirements of new systems with components similar to those for which data was placed in the master data bank.[15] From the data, Cook and her associates developed a linear regression

model which resulted in outputs which provide the personnel distribution percentages for a given skill among the several new systems for which the planning model had been constructed.[16] The Navy project had limitations. One limitation was the inability to provide data for the weapons designer. The regression model was most useful for the manpower planner at the macroscopic level.[17] Limitations notwithstanding, the work of Cook and the Navy research group points the way to future military applications of exploratory forecasting methods.

The Navy research effort by Cook represents a very promising blend of the precausal methodology and DELPHI techniques suggested by Dr. Amara. There are numerous studies based upon DELPHI techniques which provide long range planning input. In fact, the Army has a long range technological forecast which provides descriptions of technologies with lucrative military applications. The forecast offers judgments concerning the impact of a list of technologies and the time frame in which to expect useful operational capabilities for systems incorporating the technologies. The major criticism of the Army Long Range Technological Forecast is that it is merely a "shopping catalog." It is not a working document keyed to projected future development. The Long Range Forecast could serve as a useful reference list of militarily significant technologies, but DARCOM (Materiel and Readiness Command, Department of the Army) must review and revise the forecast preferably on a routine schedule of at least every two years.

CHAPTER III

DOCTRINAL FORECASTING: A DIGRESSION

The elements of the planning for the long range have been sketched. Yet, the forecasting or the planning is not an end, only a means to achieving a hypermodernized Army capable of meeting the threats to our national security. The Army which we will need in the year 2010 is sure to be as different from today's Army as the Army today is from that which fought WW I. This hypermodernized Army must be achieved by weighing relative benefits of systems and making tradeoffs between quantity and quality because of the constraints of tight budgets.[18] Decisionmakers will be forced to rely increasingly upon models which can measure the aggregate rather than the suboptimal impact of new concepts and new systems.[19] But there must be a beginning to the analysis. Decisions concerning the nature of the future battlefield must be made to provide a framework for basic thought and constructive analysis. The author elects not to state a need for doctrine forecasting and move on. Rather, one begins with the work of Lanchester to provide an example of the doctrinal concerns which drive the forecasts of military thought and concept. Written in 1916, Frederick Lanchester's book, Aircraft in Warfare: The Dawn of the Fourth Arm, has become a classic because it contains the rudimentary elements of the operations research and systems analysis pertinent to military applications. As such, the Lanchester work is an appropriate start point to construct a concept of the future battlefield. Lanchester's most often quoted law is the square law.[20] An important corollary is the linear law.[21] The consequences of the laws beyond providing the building block calculus for war games should be of urgent concern to the planner. Consider first the square law. The law provides the measure of the result for which both the effectiveness (E)

of the system and the square of the number (N) of employed systems multiply to give the combat power (P) of the force in battle (i.e., $P = EN^2$). Lanchester described historically the nature of battle and developed the linear law to represent those cases for which the number of systems was suppressed as an element in the measure of the combat power of a force (reduces equation to $P = EN$).

Historically, close combat reduced outcomes to the effectiveness of systems. The opponent with the most systems usually won unless some brilliant tactical maneuver was employed to split the force of the adversary and thereby reduce the odds by offering combat in detail. The opportunities on the battlefield promise to continue to obey Lanchester's laws. Most significant is the validity of the linear law for forces at long range. A force which expects to be outnumbered yet to enjoy a technical superiority is led by a Lanchester analysis to seek ways in which to make the combat remain at long range or classically, to frustrate the opponent's attempts to mass at effective ranges. Moreover, defenses which divide to provide depth, such as in the US covering force, main battle area, reserve concept, must employ weapons which have high relative effectiveness and a long range standoff capability. Two important rules remain. First, the tradeoff between quantity and quality is not a one for one linear relationship. A quadrupling of effectiveness is necessary in order to cut the force size in half and maintain the same combat power.[22] Second, a small force in the open has virtually no effect on a vastly superior force.[23] In a modern sense this can be translated into either the need to prepare defenses or reduce exposure time for the attacker. One also draws a reminder from Lanchester. Forcing the enemy to divide his forces is still a superior tactic.[24]

Lanchester provides the basis for framing the doctrine for the hypermodern battlefield of the near twenty-first century but a broader view must consider

"how to fight" and ". . . with what." One approach to the tactical question is the historical one. The classical methods of victory were based upon first, striking the adversary a blow from the flank or rear to cut his line of supply and communication. Weakened by such a blow, the opposing force was then an easy victim subject to defeat at the leisure of the superior tactician who struck the indirect blow. This indirect approach has been outlined in some detail by Helms in a 1979 Military Review article. The specifics will be considered a bit later in the text. Second, tactical success has been often the reward for the force with superior mobility or in those rare instances of near static warfare the force which restored mobility to the battlefield was often handsomely rewarding with tactical and even strategic victory.

A wrinkle on the mobility idea was provided in a 1969 Military Review article. The author, Rigg, outlined what he termed Kinesthetic Warfare to describe a doctrine based upon quickness and rapidity. Interestingly, Rigg gave as a cornerstone to his future warfare concept the imperative that we use technology to force obsolescence on our adversary and thereby realize victory through our superiority and the related avoidance of conflict by the opponent who must convert or catch up his force posture.[25]

The Kinethetic warfare concept also includes a view of future warfare which incorporates deep thrusts into enemy territory, a capability which would require the capacity to look deep into the enemy territory to acquire intelligence.[26] The "deep look" will allow attacks on several deep targets in a short period. Such attacks will not be in the form of "hit and run" raids, but will involve attacking forces up to corps size. Operations will be geared to destroy opposing forces and disengage.[27] More specifically, future warfare may be described as a rapid sequence consisting of a sweep, swarm, mass, attack, and disperse. This process will be repeated at widely dispersed geographic locations in very small time periods.[28] An analogy to help visualize the warfare

of the future might be that of a flight of bees initially dispersed over a wide area, then flying in on long dive paths, accelerating, then grouping into tight cells, then clustering for the final strike by the complete swarm, and then flying off to disperse only to repeat the process again and again. A combat vehicle for such warfare must move rapidly and be designed to survive while penetrating deep into enemy zones of operation.[29] Moreover, the vehicle should provide its own capability to find targets as well as kill them.[30]

The systems suggested by Rigg are only part of what is needed to foster success on the future battlefield. Doctrine must breathe new life into the spirit of the offense--a spirit which has been virtually lost because of our preoccupation with defense. Major Robert Helm's 1978 Military Review article refined the classical indirect method of combat and outlined methods which could bring victory even to outnumbered forces.[31] Helms defined the "indirect approach" in terms which converge with the Riggs Kinesthetic Warfare concept and the basic principles derived from Lanchester. The operational elements of Helm's concept are:[32]

(1) locate or create favorable situations to exploit

(2) avoid enemy strengths--attack weaknesses

(3) do the unexpected

(4) achieve victory through maneuver

(5) act boldly--distract--dislocate--defeat the enemy

The analysis of the doctrine of future warfare has been introduced here. One can begin to derive some suggestion concerning those issues which may provide the direction for long range planning efforts. The key to the problem of hypermodernization is the degree to which thought is focuses on the revolutionary concepts which may be born as a result of synthesizing the basics of battlefield doctrine with new technology. True, many new concepts may evolve

from existing structure and doctrine but the Army must increasingly work to define the battlefield of tomorrow and build structure and systems in a systematic fashion consistent with the hypermodern view of the future.

CHAPTER IV

EXECUTING THE ACQUISITION PROCESS

The preceding discussion leads to some examination of the existing procedures for the acquisition of new Army meteriel systems. The Department of Defense prescribes the basic procedures in its directive 5000.1. The most visible manifestation of the directive is what is commonly termed the "DSARC" (DEE-SARK) process. The DSARC (Defense System Acquisition Review Council) provides oversight and review through established decision points throughout the acquisition cycle.[33] The services have a System Acquisition Review Council (SARC). Hence the Army's ASARC provides another layer of review and oversight to fulfill the provisions of DOD Directive 5000.1. Since the process began in 1969 by then Deputy Secretary of Defense Packard, a continued refinement of the process has ensued. In 1974 the Budget Reform Act directed more thorough consideration of real needs before developing new systems.[34] Consequently, the Office of Management and Budget (OMB) Circular A-109 prescribed an additional decision point which forced the Army to describe a capability as the initial step (SARC:0) in the acquisition process. The resulting DSARC/ASARC process incorporates:[35]

Milestone 0: Initiation wherein the capability required is described in a Mission Element Needs Statement (MENS)

Milestone I: Demonstration and validation allows for competitive selection among alternative concepts to achieve the required capability.

Milestone II: Full Scale Engineering Development includes selection of system, operational testing, and evaluation.

Milestone III: Production and Deployment provides approval for production and authorization to deploy to users.

The Army has an elaborate scheme to track new systems through the acquisition cycle. The result is an overlapping set of agencies each seeking to insure that we get the best system--cheaply and quickly. The group of people

who work to bring the new material into the structure come under several of the Army's major commands and staff agencies. DARCOM provides the principal manager. The "Pro-manager" is the shepherd of the system. Whether termed (Program, Project, Product) Manager, or Project Officer, he must meet all decision challenges and is responsible to bring the system to deployment. Within the Training and Doctrine Command (TRADOC), the TRADOC Systems Manager (TSM) oversees doctrine, training, and organizational changes which are required as a result of fielding a new equipment system.[36] At the staff level within ODCSOPS and ODCSRDA are respectively the Force Integration Staff Officer (FISO) and Department of the Army System Coordinator (DASC). These officers insure the DARCOM manager receives support from the Department of the Army while holding the manager responsible to meet the general Army guidance pertaining to force capability and structure.

Other players, though important to the oversight and review functions, are not as well known as those discussed above. Within DARCOM, the Associate Director for Cost Performance Reporting monitors the performance of contractors during production. The goal is to cut waste and meet production schedule milestones. The Cost/Schedule Control Systems Criteria has produced a data base on subsystem costs which foster improved contract decisionmaking both by the contractor and the Army. Guesswork on cost is reduced and more importantly the Army can better manage the high risk cost reimbursable and incentive-type contracts.[37] In addition to the cost control, some specialized quality control of systems is achieved by the independent review and analysis done by the Logistics Evaluation Agency (LEA). Perhaps the most important function of the LEA is to insure systems are not fielded without careful consideration of the cost in people, time, and dollar resources associated with sustaining and maintaining the new system.[38] Finally, external to the Army are layers of decisionmakers who seek to get the most defense possible for dollar spent.

The list includes civilians on the staff of the Secretary of Defense, congressional staffers, OMB analysts, analysts with Programming Analysis and Evaluation (PAE) of DOD, as well as executive aides to the President. The result is constant debate to produce the "best for less," but a side effect is some system paralysis. The review process is very cumbersome. Mr. Norm Augustine cites some 144 congressional decision points for a program which takes eight years to reach full production.[39]

It follows that our system for execution to acquire a new system is quite well established though fraught with redundant checks, and potential for major revision or cancellation occurs at numerous times throughout the acquisition cycle. These criticisms notwithstanding, the system works and am impressive array of new systems are soon to enter the Army's inventory. One cannot, however, derive evidence to support the existence of a system for Long Range Planning. All of the actors are caught up in current operations. Most analysis validates existing doctrine and conventional military wisdom, with only minor efforts toward evolutionary thinking which might produce perturbations in concepts of warfare which have stood for over forty years. It is not possible to get to the hypermodernized Army by continuing to do business in the manner we do it today. Establishing an ad hoc committee to monitor the modernization effort of the Army is prima facie evidence that some redesign may be necessary to develop the systems of the future.

CHAPTER V

TOWARD BETTER LONG RANGE PLANNING

CONCLUSIONS

Several conclusions may be drawn which parallel the background development which preceded. First, long range planning is becoming increasingly important to decisionmaking. Second, the analytical tools for long range planning have become more powerful and generally more accepted. Third, some recent successes with forecasting point the way to significant payoff for military planning and decisionmaking. Fourth, the changes in weapons systems over the past three to four decades creates a demand to revise basic doctrine. Fifth, the acquisition system is too cumbersome. Moreover, demand on the system to produce "bigger and better" weapons and materiel has increased the overall time to develop new items for the Army inventory. Sixth, long range planning receives short shrift in the acquisition cycle in order to execute current programs in a cost effective manner.

The conclusions indicate the need to improve the method for bringing on new Army systems. However, the conclusions are merely symptoms of the problem--the inadequate system for Army long range planning for the use and integration of new technology into new Army weapons and materiel. Therefore, rather than recommend remedies for the individual problems inherent in each conclusion, it is more constructive to provide a portrait of the solution to redress the inadequacy in the Army's long range planning effort.

RECOMMENDATION: A MODEL FOR LONG RANGE PLANNING

The framework for the remediation of the planning dilemma starts with concept. The battlefield of the hypermodern future must be defined in many of

the terms outlined in previous discussion. The salient elements must include:[40]

--Sophisticated "ultraperceptive" intelligence capability

--Resurgence of the advantage of maneuver

--Enhanced shock action

--Capability to operate at extreme depths within opposing force area

--Major technological advantages to render bankrupt investments in the key weapons system of the opposing force

--Continuous combat throughout periods of reduced visibility[41]

--"Rebirth" of the nuclear battlefield

Given a concept of the hypermodern warfare, planners could work backward to choose the most relevant technologies. The model offered by the author draws on the work of Henry Rowen, Air University, which lists:[42]

--Sensing and transmitting over a wide range of electromagnetic spectrum

--Data processing

--Advances in aerodynamics and propulsion

--Improved ordnance

The capabilities which inhere to the technologies are:[43]

--Detect in a variety of environments

--Extract signal from noise and guide vehicles to target with precision

--Design and build small aerodynamic vehicles which can fly low and penetrate deeply

--Tailor weapon effects and reduce error of delivery

The important caveat is that such analysis of the future battlefield and related technology and capabilities is a dynamic process. The use of forecasting methods to produce key guidelines is urgent business. The look to the future has recently been the sole purview of the TRADOC commander. A superior method of designing the future battlefield and specifying needed technology and

capability would be a DELPHI study using military experts--civilian, professional military, active or retired, to provide the input. Such a collection of data would permit priorities to be established among incipient technologies. The Army can push those technologies which show promise to develop the weapons systems which would permit US forces to fight in a manner consistent with the long range planner's view of the battlefield. Once the key technologies are identified, theoretical systems design follow. The dominant characteristics and capabilities of the theoretical system can be incorporated into a wargame in order to determine battlefield performance values for the new systems. The wargaming phase is one which has increasing potential as computer models become more sophisticated. From such simulations as have been run at RAND,[44] a system decision could be made.

Once the system decision is made, the acquisition cycle could proceed much as it does now for high dollar new development items. Some revisions which would make it easier to hypermodernize are: (1) reduce the number of decision points in the acquisition cycle; and (2) fund the programs completely and leave it to industry to produce an item to meet the desired capability rather than respond to a highly specified set of weapon design characteristics.[45]

To those ends some reorganization may be necessary. The purpose of reorganization would be to increase the level of precision in the acquisition process. The specific focus would be on the long range planning effort. At first blush one could easily be drawn into looking for a highly structured and highly directed system for the acquisition of new weapons. To the contrary, such a highly centralized approach would deny the great advantage which comes from our current system. The advantages of innovation, creativity, ingenuity, derive directly from our basic social system. Therefore, any change for the Army should continue to promote the spirit of creative expression and concurrently

develop a means to plan for the long range with a clear sense of direction. The direction must be based upon a goal to achieve a quantum increase in our capability relative to the most sophisticated opposing force--the Soviet Union for the foreseeable future. Discussions with Dr. Roy Amara of the Institute for the Future and Rand Corporation analysts surfaced strong sentiment for some increased structure for the planning without setting aside the benefits derived from our open research effort. The Army could adopt the Air Force system of the affiliated research institute such as RAND. RAND came into existence initially as a subdivision of McDonnell-Douglas to respond to Air Force research demands incident to Air Force related aerospace contracts. The Air Force materiel acquisition leadership meets semi-annually to determine how well RAND is doing in providing for future system needs of the Air Force. Such an arrangement could work for the Army. Battelle and RAND, as examples, are already deeply engaged in Army weapons system research. Stanford Research Institute (SRI) is also very involved in ground combat research and could work many of the long range planning problems related to doctrine. The Army must develop an interface to accommodate the research effort. One candidate would be the Requirements Directorate of ODCSOPS. The Requirements Directorate should be the focal point for long range planning efforts relating to new systems and doctrine.

There will certainly be critics of proposals offered here, but aside from the invasion of jealously guarded preserves of Army service interests within the major commands, the benefits appear compelling. Without purposeful long range planning, the Army will not be able to pass through its current modernization crisis and reach a state of hypermodernization wherein it again enjoys a clear technological and doctrinal advantage over the Armys of potential adversaries.

ENDNOTES

1. Herman Kahn and Anthony J. Wiener, The Year 2000: A Framework for Speculation on the Next Thirty-Three Years (New York, 1967), p. 75.

2. Mr. Peters, in conversation with the author at SRI on 28 March 1980, expressed serious reservations about the validity of a cycle which is as short as that given by Kahn. Although he agreed in principle with Kahn, Peters stressed the definition of significant technologies is the key to the difference in outlook. Peters constructs a list of technologies smaller than that offered by Kahn and hence less frequent doctrinal changes result.

3. A conversation between the author and Mr. Whalen at SRI on 28 March 1980 was the source of the observation. Mr. Whalen makes the point that our constitutional process unlike the centrally directed Soviet system has so much legally based change as to preclude effective long range planning. Whalen points to the two year congressional term vice the life term of Soviet officials, as merely one example of the institutionally generated turbulence which pervades the US acquisition process.

4. James R. Bright, A Brief Introduction to Technology Forecasting: Concepts and Exercises (Austin, Texas, 1972), pp. 4-2 - 4-3.

5. D. G. Brennan, Fashions in Military Technology Fifty Years Hence (Croton-on-Hudson, New York, 1968), p. 2.

6. Olaf Helmer, Analysis of the Future: The Delphi Method (Santa Monica, California, 1967), p. 2.

7. Ibid., p. 3.

8. David M. Kiefer, "Technological Forecasting in Technology Assessment," Technology and Man's Future, ed by Albert H. Teich (St. Martin's Press, New York, 1977), pp. 304-307.

9. Bright, op. cit., pp. 1-3.

10. Kiefer, op. cit., p. 303.

11. COL Richard G. Head, "Technology and the Military Balance," Air War College Associate Programs: Military Strategy and Aerospace Power (Maxwell AFB, Alabama, 1979), II, p. 27.

12. Brennan, op. cit., p. 6.

13. Reine K. Huber, Lynn F. Jones, Egil Reine (eds.), Military Strategy and Tactics: Computer Modeling of Land War Problems (New York, London, 1975), p. 10.

14. One of several "myth-busters" provided in a stimulating conversation with John Emanski, Jr. during a seminar at SRI on 28 March 1980.

15. Pamela Cook, et. al., Advanced Technology Manpower Forecasting (Arlington, Virginia, 1977), p. 16.

16. Ibid., p. 22.

17. Ibid., p. 33.

18. Huber, Jones, Reine, op. cit., p. 3.

19. Ibid., p. 11.

20. Frederick William Lanchester, Aircraft in Warfare: The Dawn of the Fourth Arm (London, 1916), p. 48.

21. Ibid., p. 52.

22. Ibid., p. 50.

23. Ibid., p. 56.

24. Ibid., p. 44.

25. COL Robert B. Rigg, "Kinesthetic Warfare," Military Review, XLV (September 1965), p. 16.

26. Ibid.

27. Ibid., p. 14.

28. Ibid., p. 19.

29. Ibid., p. 17.

30. Ibid., p. 18.

31. MAJ Robert F. Helms II, "The Indirect Approach," Military Review, LVII (September 1978), p. 4.

32. Ibid.

33. Department of Defense (DOD) Directive Number 5000.1, January 18, 1977, p. 2.

34. Seymour T. Deitchman, New Technology and Military Power: General Purpose Military Forces for the 1980's and Beyond (Boulder, Colorado, 1979), p. 232.

35. DOD Directive 5000.1, op. cit., pp. 3-4.

36. Derived from lecture to Project/Program Management Course, US Army War College (USAWC) given on 11 March 1980 by COL Lauris M. Eek, Jr., Program Manager Office, Headquarters, Department of the Army Materiel and Readiness Command (HQ, DARCOM).

37. Derived from lecture to Project/Program Management Course, USAWC, given on 1 April 1980 by COL R. E. Frye, Jr., Associate Director for Cost Performance Reporting, HQ, DARCOM.

38. Derived from lecture to Project/Program Management Course, USAWC, given on 15 April 1980, by Mr. Norm Shires, US Army, Logistics Evaluation Agency.

39. "Interview with Former ASA (R&D) Norman Augustine," Army Research, Development, and Acquisition (Magazine), Vol. 21 (January-February 1980), p. 9.

40. Rigg, op. cit., p. 14.

41. John Emanski has provided a detailed analysis of "continuous combat" emphasizes advantages which derive from continuous land warfare. See John J. Emanski, Jr. Continuous Land Combat (SRI International Technical Report, SRI Project 4940), September 1977.

42. Henry Rowen, "New Weapons Technologies and East-West Security in the 1980's," Air War College Associate Programs: Military Strategy and Aerospace Power (Maxwell AFB, Alabama, 1979), II, p. 6.

43. Ibid.

44. For more detail on the modeling and gaming of conceptual systems refer to E. W. Paxson, M. G. Weiner, R. A. Wise, Interactions Between Tactics and Technology in Ground Warfare. The report done at RAND for the Defense Advanced Research Projects Agency was published in January 1979 under report number R-2377 ARPA.

45. Derived from remarks during a lecture by Norman Augustine at the US Army War College, given at Carlisle Barracks, 11 February 1980.

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ANNEX A

FUTUROLOGY PUBLICATIONS

The publications which are listed below are those publications which treat the subject of forecasting and long range planning for the future. The list is not exhaustive, but is extensive enough to show the great interest in material which deals with the future in a definitive way.

The reference for the listing is the October 1974 issue of Futures Magazine. Starting on page 445 is an analysis of Michael Marien's work on futures information. The list provided in Futures contains over 100 periodical entries to include several publications in foreign language. Those documents which Marien grouped into the "Generalist/Futurist" Category seem to hold the most value for the long range planner and are listed as follows:

Behavioral Science

Ekistics

ETC: Review of General Semantics

Futures

Futurist

General Semantics Bulletin

General System Yearbook

Humans and Social Forecasting Newsletter

International Journal of General Systems

Journal of the American Institute of Planners

Social Forecasting Abstracts

Social Forecasting Directory

Systematics

Technological Forecasting and Social Change

Urban Affairs Quarterly

World Future Society Bulletin

ANNEX B

KEY ADVANCE RESEARCH PROJECTS

Below are listed some key technologies which will promote the capabilities which were discussed as important to the hypermodern Army force. Each technology is placed in a category as given by the Rowen analysis cited on page 20. The source of the technologies is the Battelle Report on Identification of Strategically Significant Technologies. A classified version of related technologies may be constructed by review of Volumes I through III of the Long Range Technological Forecast (SECRET).

CATEGORY A: DETECT IN A VARIETY OF ENVIRONMENTS

1. Conformal Antenna Arrays
2. High Dynamic-Range Receivers
3. Infrared Detector and Materials
4. Intensified Array Detectors
5. Low Light-Level Imaging
6. Tunable IR Filters
7. Wide-Angle Narrow-Band Filters
8. Ultra High-Speed Photography

CATEGORY B: EXTRACT SIGNAL FROM NOISE AND GUIDE VEHICLES TO TARGET WITH PRECISION

1. Wide-Band Low-Noise Receivers
2. High-Performance Clutter-Rejection Radar
3. Enhanced Computer Memories
   -- Bubble Memory and Logic
   -- High Density Cores
   -- Rapid Access Erasable

CATEGORY C: DESIGN AND BUILD SMALL AERODYNAMIC VEHICLES WHICH CAN FLY LOW AND PENETRATE DEEPLY

1. Centrifugal Compressor for Small Turbine Engines
2. Pulsed Power Generation
3. Thermoelectric Energy Conversion
4. Photo-assisted Electrochemical cells
5. Advent of Supercritical Aerodynamic Technology
6. Extensive use of Computer-based Aerodynamic Design
7. Airfoil Design for Low Hover or VSTOL Craft

CATEGORY D: TAILOR WEAPON EFFECTS AND REDUCE ERROR OF DELIVERY

1. Advanced Computer Design
   -- Artificial Inte-ligen-e Software
   -- Large Memory Design
2. Corrosion/Erosion Resistant Coatings
3. High Power Optics
4. Laser Gyro Technology
5. Specialized Space Antennas
6. High-Precision Clocks and Frequency Standards
7. Inertial Navigation Systems

ANNEX C

THE RESEARCH SYSTEM

Funding for advanced research is provided across the spectrum from basic hypotheses to fundamental application. The research dollars are allocated by fund categories defined as:

6.1: Basic Research

6.2: Exploratory Research

6.3: Advanced Research

The broad range of the research impacts throughout the eight phases of the technological innovation process (see page 4).

However, the most of the research effort results in direct expenditures for the phases:

1. Idea
2. Proposal or Design Concept
3. Verification
4. Lab Demonstration

The ASARC/DSARC process profits from the research primarily during the first two decision steps. The mission analysis and evaluation of alternatives can draw heavily on promising technology which is developed in the research system.

In the Autumn issue of Defense Systems Management Review, Dr. Marvin E. Lasser, Director of Army Research, outlines the reorganization of the Army research.

> The research system has been reorganized to improve the usefulness of the work at the national laboratories and educational institutions. The reorganization purports to provide direction. However, the system is designed with primary emphasis given to decentralized operation to promote the innovation process. A great deal of

autonomy is given to the directors of the national laboratories and research centers.

The reorganization move does promise greater user (i.e. Training and Doctrine Command) involvement in the planning process by establishing a Science and Technology Objectives Guide. The guide is formulated around capabilities. Dr. Lasser is pointing the way, but the entire Army must be involved for the Research Director's effort to pay off.